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## Appendix B: Product integrity

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This chapter presents information about MIRAN reliability, environmental specifications, and electrical regulatory standards.

### Reliability

Reliability is measured by the Failure Rate (in FITS), Mean Time Between Failures (MTBF), and the Return Rate.

- **Failure Rate (FITS)** - predicted failure rate per billion hours of operation is 1168.
- **Mean Time Between Failures (MTBF)** - expected mean hours of operation between failures is 98 years.
- **Return Rate (% per year)** - expected return rate per year for the first 2 years is 1% per year.

### Environment specifications

This describes the operating and storage temperature ranges and humidity for MIRAN. The ideal operating temperature is obtained when the environmental temperature is regulated using air-conditioning, however MIRAN is design to operate in the standard telephony equipment accepted temperature and humidity ranges.

Table B-1 displays acceptable temperature and humidity ranges for the MIRAN card.

**Table B-1**  
**Temperature-related specifications**

| Specification                | Minimum                         | Maximum              |
|------------------------------|---------------------------------|----------------------|
| Normal Operation             |                                 |                      |
| Recommended                  | 15° C                           | 30° C                |
| Relative humidity            | 20%                             | 30% (non-condensing) |
| Absolute                     | 10 ° C                          | 45° C                |
| Relative humidity            | 20% to                          | 80% (non-condensing) |
| Rate of change               | Less than 1° C per 3 minutes    |                      |
| Storage                      |                                 |                      |
| Long Term                    | -20° C                          | 60° C                |
| Relative Humidity            | 5%                              | 95% (non-condensing) |
|                              | -40° C to 70° C, non-condensing |                      |
| Short Term (less than 72 hr) | -40° C                          | 70° C                |
| Temperature Shock            |                                 |                      |
| In 3 minutes                 | -40° C                          | 25° C                |
| In 3 minutes                 | 70° C                           | 25° C                |
|                              | -40° to 70° C, non-condensing   |                      |

## Electrical regulatory standards

The following three tables list the safety and electro-magnetic compatibility regulatory standards for the MIRAN, listed by geographic region. Specifications for the MIRAN meet or exceed the standards listed in these regulations.

### Safety

Table B-2 provides a list of safety regulations met by the MIRAN, along with the type of regulation and the country/region covered by each regulation.

**Table B-2**  
**Safety regulations**

| Regulation Identifier        | Regulatory Agency             |
|------------------------------|-------------------------------|
| UL 1459                      | Safety, United States, CALA   |
| CSA 22.2 225                 | Safety, Canada                |
| EN 41003                     | Safety, International Telecom |
| EN 70950/IEC 950             | Safety, International         |
| BAKOM SR 784.103.12/4.1/1    | EMC/Safety (Switzerland)      |
| AS3260, TS001 - TS004, TS006 | Safety/Network (Australia)    |
| JATE                         | Safety/Network (Japan)        |

**Electro-magnetic compatibility (EMC)**

Table B-3 lists electro-magnetic emissions regulations met by the MIRAN, along with the country’s standard that lists each regulation.

**Table B-3**  
**Electro-Magnetic Emissions**

| Regulation Identifier     | Regulatory Agency                            |
|---------------------------|----------------------------------------------|
| FCC part 15 Class A       | United States Radiated Emissions             |
| CSA C108.8                | Canada Radiated Emissions                    |
| EN50081-1                 | European Community Generic Emission Standard |
| EN55022/CISPR 22 CLASS B  | Radiated Emissions (Basic Std.)              |
| BAKOM SR 784.103.12/4.1/1 | EMC/Safety (Switzerland)                     |
| SS-447-20-22              | Sweden EMC standard                          |
| AS/NZS 3548               | EMC (Australia/New Zealand)                  |
| NFC 98020                 | France EMC standard                          |

Table B-4 lists electro-magnetic immunity regulations met by the MIRAN, along with the country's standard that lists each regulation.

**Table B-4**  
**Electro-Magnetic Immunity**

| <b>Regulation Identifier</b>     | <b>Regulatory Agency</b>                       |
|----------------------------------|------------------------------------------------|
| CISPR 22 Sec. 20 Class B         | I/O conducted noise                            |
| IEC 801-2 (level 4)              | ESD (Basic Standard)                           |
| IEC 801-3 (level 2)              | Radiated Immunity (Basic Standard)             |
| IEC 801-4 (level 3)              | Fast transient/Burst Immunity (Basic Standard) |
| IEC 801-5 (level 4, preliminary) | Surge Immunity (Basic Standard)                |
| IEC 801-6 (preliminary)          | Conducted Disturbances (Basic Standard)        |
| BAKOM SR 784.103.12/4.1/1        | EMC/Safety (Switzerland)                       |
| SS-447-20-22                     | Sweden EMC standard                            |
| AS/NZS 3548I                     | EMC (Australia/New Zealand)                    |
| NFC 98020                        | France EMC standard                            |